DESCRIPTION
In this hands-on learning laboratory in which students will acquire the skills in order to construct novel aesthetic machines, which might interface with a viewer's body or react to ambient stimuli such as motion, light, sound, or intangible data. Students will experiment with programming environments such as Arduino and Pure Data, and will learn the fundamentals of using the Arduino hardware, Raspberry Pi and analog electronics to produce artworks such as kinetic sculpture, robotic art, sound installations, light art, and performance environments. Engagement with art historical and theoretical contexts is mandatory. Despite the very rigorous technical focus and instruction, artistic voice will be emphasized over technical skills. Midpoint review into New Media will be conducted during this course. Physical Computing refers to the aesthetic practice whereby some combination of physical circuitry in conjunction with digital code is used in order to sense information from an environment and in turn effect some kind of change in that environment.

COURSE STRUCTURE
The content of this course will be delivered through lectures, in-class demonstrations and exercises, quizzes, and readings.

LEARNING AND COURSE OBJECTIVES
Students who successfully complete this course will be:
- Conversant and confident in the use of the Arduino and Pure Data programming environments.
- Knowledgeable about working with microcontrollers and electronics. This includes hacking, soldering, building, coding and originating media art projects which utilize these technologies. Basic reading of schematics, using a breadboard, multimeter, etc.
- Readily prepared to initiate critically aware media art projects, which combine electronics, actuators, computer code and microcontrollers such as the Arduino and Raspberry Pi.
- Possessed of a thorough knowledge of the history, theory and aesthetics of artworks which employ the technical and theoretical concerns discussed during this course.
TEACHING PHILOSOPHY
This course is very challenging. You will undoubtedly be learning new technical skills in circuit-building and coding and new histories and theoretical contexts. As with any other class you might take at this University you will get out of this experience what you put into it. This means that you must accept the challenge of taking responsibility for your own success. My role is to provide motivation in the form of a grade; historical and theoretical context; guidance with regards to the usage of the tools introduced to complete each project; and feedback as you are in the process of creating your projects and during the final critique for each project. However, you must attend all class sessions, complete all projects as assigned, and make the individual effort to master the techniques and concepts presented during the course.

COURSE REQUIREMENTS AND CLASSROOM BEHAVIOR
You are expected to be prepared for class. This means being prepared to participate in discussions, ask questions about content presented during lectures and being pro-active about project deadlines. Reading unrelated materials, excessive talking to neighbors, and any kind of phone use are all unacceptable during class time. This activity will be noted and reflected in your grade.

Turn in assignments on time. Late assignments will be graded, but not critiqued. Late assignments will be docked a full letter grade for each day of the week they are late. This does not mean each class day. Excessive absences and late arrival to class will be noted and reflected in your grade. Participate consistently and thoughtfully in all class discussions and critiques, especially for those of which are not your own. This is part of your participation grade. Respect your peers’ opinions, orientations, histories, beliefs, and experiences. Pay attention, ask questions and work hard.

THEMES
robotics-cybernetics-feedback-haptic stimulation-environment-hardware-software-hacking-building-DIY-circuitry-data-open source-control (or relinquishing thereof)-schematics-energy-transduction

READING MATERIALS
All required texts will be provided in either electronic format via Blackboard or will be placed on reserve in the Library.

REQUIRED MATERIALS AND SUNDRY ITEMS
- Arduino Starter Kit: https://www.adafruit.com/products/1078?qclid=CjwKEAjwz4u9BRCbioK3stnBznESJADA75xbO26H6gNtvjc5HaSV60wjQPPT4Q-pJw4Rs1VNYi0hoBoCiQDw_wcB
- CVAD Wood Shop Card
- Materials to build a ‘Suneater.’
- Journal or Sketchbook for jotting down ideas and notes from class
- Throughout the semester you may need to purchase, depending on your projects and your soldering skills, items such as proto-boards and electronic components
- External hard drive
- In class participation
- A willingness to experiment and the expectation of the very real possibility that you will blow up at least one project. “If you don’t fry something you’re not doing it right.”
- Breadboard
- Several hours a week outside of class time for research and work. This will not be the kind of course where projects can be done the night or the day before.
-Optional: You may want to purchase a plastic box—the kind of which one would store traditional art supplies, such as paintbrushes, paints or pastels—to keep and organize electronic parts and any tools you might wish to purchase.

*You are not required to purchase tools. We have plenty.

**RESOURCES**
UNT now has a campus-wide subscription to Lynda.com. Use these tutorials! They are invaluable. I personally have books that may be of use to you as does the New Media Department. They can be accessed during class time. Please treat them with care.

Electronic Parts:
- www.digikey.com
- www.jameco.com
- www.sparkfun.com
- www.mouser.com
- www.robotshop.com
Tanner Electronics
1100 Valwood Pkwy Carrollton, TX 75006
Radio Shack (only good for certain items)

**SAFETY FIRST!!!!!!!**
Use your common sense. If you think something is dangerous it probably is dangerous. If you have any questions about the safety of an activity please ask me. Please note that unless you consult with me you are not allowed to use anything other than battery power. This means that you are not to use wall power. This is an insurance against bodily harm and harm to your equipment. If your project absolutely needs wall power I must guide you in how to design a safe circuit for this purpose. The exception to this is if you purchase a factory piece of hardware that uses wall power and contains the appropriate step-down transformer.

**GRADING**
Students will be evaluated on projects and exercises (50%), participation (30%), and attendance (20%).

A= Superior. The grade of A indicates that work is superlative and surpasses expectations for the assignment, attendance is exemplary and the student participates in discussions in a manner that is respectful toward fellow students and which contributes to productive class discussions.

B= Above Average. The grade of B indicates that work is extraordinary and goes beyond the minimal requirements of an assignment. Attendance and participation are exemplary.

C= Average. The grade of C indicates that work is completed as assigned and submitted by deadline. Attendance and participation are lackluster.

D= Below Average. The grade of D indicates that work is completed, but is not completed as assigned. Attendance and participation are poor.

F= Fail. The grade F indicates that work is not completed as assigned according to deadline and that attendance and participation are minimal.

**ATTENDANCE**
You are allowed only THREE unexcused absences. After the FOURTH absence your grade will drop a full letter for each subsequent absence. If you miss class it is your responsibility to acquire the information you missed on the day you were absent. If you are aware that you will be absent prior to the date of an absence you must notify me. Excused absences are granted in the case of illness accompanied by a doctor’s note and documented personal and/or family emergency. You are allowed TWO unexcused absences. Attend class on time. Two tardies (10 min. after class begins) will result in one absence.

**ACADEMIC MISCONDUCT**
In order to provide a campus environment that is conductive to academic endeavor and growth, the UNT Code of Student Conduct and Discipline provides regulations and guidelines governing student behavior. The code provides penalties for misconduct, including academic dishonesty, which includes all forms of cheating and plagiarism, including attempts to circumvent attendance procedures.

The term cheating includes, but is not limited to a) use of any unauthorized assistance in taking quizzes, tests, or examinations; b) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; c) the acquisition, without permission, of tests or other academic material belonging to a faculty or staff member of the university; or d) any other act that is designed to give a student an unfair advantage.

This policy protects honest students from unfair competition with dishonest students who seek to gain advantages by cheating. Students who become aware of suspicious activities should notify me as soon as possible. Acts of academic dishonesty will result in a grade of ‘F’ in the course as well as disciplinary action.

UNT PLAGIARISM POLICY

Plagiarism is a serious violation of UNT’s code of academic conduct. The UNT Code of Student Conduct and Discipline, Policy Manual, Graduate Catalog, and Undergraduate Catalog explain specific policies, penalties, and the appeals process. The UNT Policy on Academic Misconduct provides definitions of plagiarism and states that the instructor can assign penalties for violations of the policy.

The term plagiarism includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment. Plagiarism also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

The UNT policy further states that all students:

are responsible for making themselves aware of the definitions and implications of academic misconduct. For further information on academic misconduct, penalties and appeal procedures, the student should refer to the "Code of Student Conduct and Discipline."

Penalties are assigned by instructors and can range from reducing the grade for a test or assignment to revoking an academic degree already granted.

DISABILITY STATEMENT

The College of Visual Art and Design is committed to full academic access for all qualified students, including those with disabilities. In Keeping with this commitment and in order to facilitate equality of educational access, faculty members in the College will make reasonable accommodations for qualified students with disability, such as appropriate adjustments to the classroom environment and the teaching, testing, or learning methodologies when doing so does not fundamentally alter the course.

If you have a disability it is your responsibility to obtain verifying information from the Office of Disability Accommodation (ODA) and to inform me of your need for an accommodation. Requests for accommodation must be given to me no later than the first week of classes. Grades assigned before an accommodation is provided will not be changed. Information about how to obtain academic accommodations can be found in UNT Policy 18.1.14, at www.unt.edu/oda, and by visiting the ODA in Room 321 of the University Union. You may also call the ODA at 940.565.4323.

COURSE RISK FACTOR

This course recognizes that there are certain risks inextricably associated with certain activities within the lab, and categories are assigned to those risk factors. Working with computers in a lab
environment such as this class is considered a category 2 risk. I ask every student to be especially mindful of these risks. Be concerned for your safety and the safety of those around you, specifically as it relates to how you use your computer equipment.

BUILDING EMERGENCY PROCEDURES
In case of an emergency (alarm will sound), please follow the building evacuation plans posted on each floor of your building and proceed to the nearest parking lot. In case of a tornado (campus sirens will sound) or other weather related severity, please go to the nearest hallway or room on your floor without exterior windows and remain there until an all clear signal is sounded. Follow the instructions of your faculty and act accordingly.

CENTER FOR STUDENT RIGHTS AND RESPONSIBILITIES
Each University of North Texas student is entitled to certain rights associated with higher education institutions. See www.unt.edu/csrr for further information. The faculty retains the right to change the syllabus with or without notice.

NEW MEDIA ART MISSION STATEMENT
The mission of the New Media Art program at the University of North Texas is to cultivate new methods of performance and media art practices in contemporary art. Through creative and critical inquiry, we emphasize artistic excellence, interdisciplinary learning, socially engaged practices, and welcome collaboration. We see our mission as the study and practice of visual culture, past and present, in order to understand how the convergence of performance, storytelling, and media can illuminate and expand, or conceal and limit the worlds they represent. Finally, we recognize that example is the best teacher and strive through our own creative research to embody the values we wish to impart. Pursuing research and creative opportunities, both locally and internationally, we draw upon and engage with the current critical discourse around Media and Performance Art.

This mission is fulfilled:

• Through innovative active learning curricula that contributes toward and engages with current practices and theoretical structures
• By continually investigating emerging media and technologies, as well as traditional approaches, as a way to open new channels of research and practice
• Through a belief that diversity—in background, status, culture, and viewpoint—is essential to a vital and creative community
• By expecting academic excellence as a fundamental part of a professional education in the visual arts
• Through a commitment toward rich engagement within our communities through community based learning experiences and service related activities
• By fostering an intellectual community within which experimentation is key
SCHEDULE
Week 1: Course overview/Introduction to Physical Computing and Responsive Arts, Coding Environments, Microcontrollers, Circuits and Basic Electronic Theory

Week 2: Kinetic Sculpture

Week 3 through Week 5: Fundamentals of Coding for Arduino; Sensors, Actuators; Transducing one form of information into another; Soldering, Hacking and Building.

Week 6: Project Critiques

Week 7 through 10: Integrating Raspberry Pi and Arduino

Week 11: Project Critiques

Week 12 through 14: Machine Vision/Machine Listening; Video and Audio Synthesis; Useful analog circuits for your projects

Week 15: Lab Time

Week 16: Project Critiques

DEADLINES
August 31: Printed syllabus, liability form and student work form
September 7: Arduino kit and CVAD Shop Card
September 14: 1 motor Kinetic Sculpture
September 18: ‘Suneater’ Materials
October 5: Project 1, Arduino: Transduction
November 2: Project 2, Pure Data + Arduino: Data Sets
December 5&7: Project 3, Pure Data, Raspberry Pi and/or Arduino and/or Axoloti: original theoretical and hardware research

READING SCHEDULE
September 1: Foundation and Development of Robotic Art, Eduardo Kac, 1997

September 15: The Adaptive Brain and Ontological Theater in The Cybernetic Brain, Sketches of Another Future, Andrew Pickering, 2010

September 29: Robots to the Rescue: DARPA’s Robotics Challenge inspires new disaster-relief technology, Meghan Rosen, 2014


LIABILITY RELEASE (REQUIRED)
I understand that there will be some danger in connection with my participation in this New Media Art studio class because certain injuries may occur in carrying out these activities. After good and valuable consideration, I assume responsibility for all possible injuries resulting from my participation and hereby voluntarily agree that in the event of any accident, injury, loss of property, or other difficulty incidental to the activities or transportation to and from the activities, I will not make any claim of any kind against UNT or its agents, employees and representatives and/or students, and agree to hold said UNT, its employees and representatives and/or students harmless from any and all liability and legal responsibility. I recognize that I alone am responsible for my safety and health and based on my present knowledge of the correct methods and being of legal and adult age, I accept the responsibilities and possible injuries involved in these activities. I further agree to become familiar with the rules and regulations of UNT concerning student conduct and to not violate said rules or any directive or instruction made by the person or persons in charge of said activities and I will assume the complete risk of any activity done in violation of any rule or directive or instruction.
I understand that I am urged by UNT to obtain adequate health and accident insurance.

BACK SYLLABUS CONTRACT AGREEMENT: ASTU 3450 Fall 2017

Printed name___________________________________
Signature______________________________________
Date__________________________________________

A parent or legal guardian must sign for persons under age 18.
I, the undersigned, am a student at the University of North Texas (UNT) and I am enrolled in ______________________________ (name of course). By my signature below I hereby grant permission to UNT to use, copy, reproduce, publish, distribute or display and all works created to comply with the requirements of this course in accordance with the terms set forth below. Additionally, I consent to the disclosure of the work created in this class as may be accompanied by my name and other personally identifiable information for purposes as set forth below.

2. **Scope of permission.** This permission extends to the use of the described work and images of such work: 1) for academic purposes in order to demonstrate examples of student work to current and future UNT students; 2) for public display in the galleries or on the campus of UNT or on the UNT website; 3) for promotional materials created by UNT in all forms of media now known or later developed, including but not limited to exhibition catalogues, direct mail, websites, advertising and classroom presentations. My permission is on-going and will continue until such time as I revoke it by giving UNT three months written notice of revocation to the professor of record for this course. UNT will have three months from the date of my notice to stop all use in accordance with this permission.

3. **Certificate of ownership.** I am the owner of all the work submitted in accordance with the requirements of the named course and the work is not subject to any grant or restriction that would prevent its use consistent with this permission. All aspects of the work are original to me and have not been copied. I understand that as owner of the work I have the right to control all reproduction, copying and use of the work in accordance with U.S. copyright laws.

4. **Privacy release.** I hereby authorize and consent to the release, maintenance and display of my name if necessary and any other personally identifiable information that I have provided in connection with the work and its use in accordance with the terms of this Agreement.

5. **Signature.** By signing below, I hereby grant the permissions indicated above. I understand that this grant of permission relates only to the use of the described work. This is not an exclusive right and I may sell, give or otherwise transfer the rights to such work to others on a non-exclusive or exclusive basis. However, in the event that I do sell, give or otherwise transfer ownership or the exclusive right to use my work to another party, I will notify UNT immediately in writing through the professor of record for this course. UNT will have three months from the date of my notice to stop all use in accordance with this permission.

Printed name: ______________________________

Signature: ______________________________

Date: ______________________________